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Review Article

MUSCULAR DYSTROPHIES AND AYURVEDA

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ABSTRACT

Muscular dystrophies (MD) are a group of genetic disorders characterized by progressive muscle weakness and degeneration. Becker Muscular Dystrophy (BMD) being a milder form of X-linked recessive dystrophy caused by a defect in the dystrophin gene. BMD predominantly affects proximal muscles, and its symptoms include muscle weakness, contractures, cardiac involvement, and skeletal deformities. Contemporary medical treatments for muscular dystrophies focus on managing symptoms, using drug therapy, physical therapy, and surgery, although there is no complete relief. Ayurveda offers an alternative perspective, viewing Muscular dystrophies through the lens of *Vata Dosha* imbalance and genetic defects known as "*Beeja Dushti*." The disorder is linked to impaired muscle metabolism *(Mamsadhatuagni)* and blockage in bodily channels *(Srotorodha),* leading to muscle degeneration. Ayurvedic management aims to restore balance through purification *(Shodhana), Shamana oushdhi* which is having *Brumhana* and *Balya* effect, rejuvenation *(Rasayana)* therapies, *Ekamulika prayoga* like *Ashwagandha, Kapikacchu*, and *Bala* and *Yoga* practices further support muscle function and overall vitality. While Ayurveda may not cure the underlying genetic causes, it can help to slow disease progression, improve mobility, and enhance quality of life by addressing metabolic imbalances, eliminating toxins, and promoting tissue regeneration. This holistic approach integrates ancient wisdom with modern scientific insights to offer a comprehensive strategy for managing muscular dystrophy.

INTRODUCTION

Muscular dystrophies are a group of genetic disorders characterized by progressive muscle weakness and wasting. It is genetic disease that causes progressive weakness and degeneration of skeletal muscles. It is a rare condition, affecting an estimated one in every 5000 to 10000 individuals worldwide [1]. Obtaining the accurate prevalence rate estimate is challenging due to factors such as the wide range of disease severity, variations in the age of onset and type of muscular dystrophy.

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These disorders vary in age of onset, severity and the pattern of affected muscles. All forms of muscular dystrophy grow worsens over period of time as muscle progressively degenerate and weaken. Depending on the type, it affects the ability to move, walk and perform the daily activities. It also affects the muscles of heart, lungs, gastrointestinal system, eyes, brain and other organ[2]. Symptoms of muscular dystrophy can vary depending on the type, each type can affect the different muscles and parts of the body. But the main clinical features are muscle weakness, difficulty in walking, climbing stairs and running, muscle atrophy or hypertrophy, contracture of muscles, tendons and skin, difficulty in swallowing, curved spine, arrhythmia, cardiomyopathy and intellectual disabilities. It gets worsens over time. It can result from the mutations in various genes and may be inherited in an x linked, autosomal dominant or autosomal recessive manner [3].

Classification [4]

1. X linked muscular dystrophy

a. Severe (Duchenne) muscular dystrophy
b. Benign (Becker) muscular dystrophy
c. Benign with acanthocytes (Macleod syndrome)
d. Benign with early contractures (Emery Dreifuss)
e. Scapuloperoneal

2. Autosomal recessive muscular dystrophy

a. Limb girdle (usually scapulohumeral, rarely pelvifemoral)
b. Distal type
c. Childhood type resembling Duchenne
d. Congenital muscular dystrophy

3. Autosomal dominant muscular dystrophy

a. Facioscapulohumeral
b. Scapuloperoneal
c. Late onset proximal (limb girdle)
d. Benign early onset with contractures
e. Distal
f. Ocular
g. Oculopharyngeal

In this article we are mainly focussing on the Becker muscular dystrophy its correlation with Ayurveda and its management.

Becker muscular dystrophy (BMD)

This is less severe form of X linked recessive muscular dystrophy results from defects of the same gene (dystrophin) responsible for Duchenne muscular dystrophy. It is 10 times less frequent than DMD, with an incidence of about 3 per 100000 live born males [5] and prevalence rate 4.78 per 100000 [6]. Age of onset is in between 5 and 25 years.

Causes: Mutation in gene and may inherited from the X linked autosomal recessive manner.

Clinical Features

The pattern of muscle wasting resembles like the Duchenne Muscular Dystrophy. Proximal muscles of lower extremities, are prominently involved. As disease progress the weakness becomes more generalized.

Associated features

- Cardiac involvement
- Contractures
- Skeletal deformity
- Hypertrophy of the muscles
- Mental retardation
- Myalgia without weakness
- Myoglobinuria [7]

Investigations

1. Serum creatinine kinase levels
2. Muscle biopsy-western blot analysis
3. Electromyography

Diagnosis

Serum ck level

Damaged muscles release the enzyme such as creatinine kinase into blood. High blood level of ck suggests muscular dystrophy.

Electromyography

Changes in the pattern of electrical activity can confirm a muscles disease.

Muscle biopsy

The analysis distinguishes muscular dystrophies from other muscle diseases. Special test can identify dystrophin and others markers associated with specific forms of muscular dystrophy.

Management

Currently there is no cure for any form of muscular dystrophy in contemporary science. Treatment is generally aimed at controlling onset of symptom to maximize the quality of life[8]. The available treatments are aimed to improve the abilities for daily activities and to prevent the complications that can arises from the muscle weakness, reduced mobility, heart and breathing difficulties.

Treatment may involve the combination of approaches, including drug therapy, physical therapy and surgery.

Drug therapy

- Use of steroids, such as prednisolone (0.75mg/kg/day significantly slow the progression of disease up to three years) and immunosuppressive drug.
- Action of drug:

  It can help to slow the rate of muscle deterioration and damage to muscle cells but it has side effects.

Physical therapy

- Passive stretching, appropriate positioning and assistive devices helps to prevent contractures and supports the join flexibility.
- Role of physical therapy:

  Regular exercises and deep breathing help to maintain the muscle functions, mobility and improve the breathing problems respectively.

Surgery

Surgery for fixed contractures and spinal deformities and pacemakers for heart.

1. Newer therapies

   Exon skipping, gene therapy and cell therapy.
2. Other components
   - Respiratory and cardiac care

- Psychosocial management.
- Family education and genetic counselling.

Ayurvedic Parlance

Muscular dystrophy (MD) is a group of genetic disorders characterized by progressive muscle weakness and degeneration. In Ayurveda, muscular dystrophy can be understood through the lens of *Vata dosha* and the concept of *Beeja Dushti* (defects in the genetic material or "seeds"). This ancient system of medicine offers a unique perspective on the causes, symptoms, and potential management strategies for this condition.

The Role of *Vata Dosha* in Muscular Dystrophy

Among the three *Doshas* in Ayurveda *Vata* activities are movement of body, communication and circulation. When *Vata* is in balance, it sustains the function of all organs, ensures the compactness of tissues, and supports overall vitality and longevity[9]. However, when *Vata* becomes aggravated or imbalanced, it can lead to various diseases and impairments, affecting strength, complexion, happiness, and lifespan [10].

Aggravated *Vata* can manifest as contractions, joint stiffness, bone pain, muscle atrophy, and insomnia [11] all of which are symptoms commonly seen in muscular dystrophy. In Ayurveda, muscle tissue is referred to as *Mamsa Dhatu*, which is responsible for movements like flexion, extension, and other motor functions. The weakening or depletion of *Mamsadhatu*, known as *Mamsa Kshaya*, can lead to wasting of various body parts such as the *Spik, Ganda, Oshta, Upasatha, Uru, Vaksha, Kaksha, Pidika, Udara, Greeva Shuskta* (depletion of muscle tissue of buttocks, thighs, chest, and abdomen) as well as symptoms like *Rukshagatra* (rough skin), *Toda* (piercing pain), *Gatranam sadana* (malaise), and *Dhamani shaithilya* (looseness of arteries) [12].

***Mamsagata Vata* (Vitiation of *Vata* in Muscle Tissue)**

When *Vata* becomes vitiated within muscle and fat tissues (*Mamsa* and *Medadhatu*), it results in conditions characterized by *Gourwaanga* (heaviness of the body), *Toda* (pricking pain), *Dandamushtihataruka* (the pain may feel as if one has been beaten by a strong rod or fist) and there is often a *Shrama* (sensation of severe fatigue)[13].

Factors Contributing to Muscular Dystrophy in Ayurveda

Genetics is the study of heredity. Heredity is a biological process where a parent passes certain genes on to their children which in turn express specific traits. Genes may also carry the risk of certain diseases that may pass on from parents to their offspring. Genetic diseases occur as a result of mutation or an anomaly in genome of an individual. Genetic predisposition is the augmented probability for developing a particular disease based on individual's genetic makeup.

Ancient Acharya understood and explains this in terms of *Beeja, Beejabhaga* and *Beeja-bhagavayava*[14]. It means factors responsible for inheritance are *Beeja* (germinal cell), *Beejabhaga* (chromosome) and *Beejabhagavayava* (gene). Acharya Chakrapani stated that the smallest unit found in *Shukra* (sperm) and *Shonita* (ovum) can be considered as *Beeja* of male and female. *Beejabhaga* is component lying inside the *Beeja* and it may compare with chromosome. *Beejabhagavayava* carrying hereditary character and it may compare with gene[15]. In *Sharirasthana* of Charaka Samhita Acharya said that if *Beeja* forming organ or part of *Beeja* gets vitiated corresponding organ gets abnormalities[16]. It means *Beeja dushti* can leads to hereditary diseases like muscular dystrophy.

Acharya Sushruta explains the concept of *Adibalapravrutta vyadhi. Adibalapravrutta vyadhis* is type of *Aadhyatmika vyadhi* caused by *Shukrashonita dushti* which leads to *Beeja* and *Bheejabhaga avayava dushti*[17] results in hereditary diseases like muscular dystrophy. Acharya Sushruta also explains the concept of *Khavaigunya* while explaining *Shatkriyakala*. He said that *Vyadhi* occurs at the place of *Khavaigunya*[18]. Dalhan in his commentary explains the *Khavaigunya* means the *Srotas viguntata*. So, the *Dushti* in *Beejabhaga* brings the *Khavaigunata* at *Mamsadhatu* level and leads to vitiation of *Vata dosha* which further leads to impairment in *Mamsadhatuagni*.

So, the *Beejabhaga dushti, Vata dosha* and *Mamsadhatuagni* are the most important factors in formation of Muscular dystrophies.

Samprapti Ghataka

Dosha -Vata
Dushya- Mamsa
Srotas- Mamsavaha
Stotodushti - Sanga
Agni-Dhatwagni

Pathogenesis *(Samprapti)* of Muscular Dystrophy in Ayurveda

The pathogenesis of muscular dystrophy can be traced to the obstruction of bodily channels *(Srotorodha),* genetic defects *(Beeja Dushti),* and impaired digestive fire *(Agni).* This process results in the degeneration of muscle tissue *(Mamsa Kshaya)* due to genetic abnormalities *(Beeja Dosha),* leading to an imbalance of *Vata* in the muscle tissue *(Mamsa Dhatu).* The vitiated *Vata* disrupts the proper formation of

muscle tissue by impairing the muscle tissue metabolism *(Mamsa Dhatwagni).* Consequently, the depletion of *Mamsa Dhatwagni* causes the formation of "*Ama*" (toxic waste), leading to faulty nutrition and progressive muscle degeneration [19].

Ayurvedic Management of Becker Muscular Dystrophy (BMD)

Ayurvedic management shows promise in reducing muscle damage and improving functional ability in muscular dystrophy patients, potentially leading to longer survival with less disability, although it does not address the underlying genetic cause.

Becker Muscular Dystrophy (BMD) is primarily caused by impairment in *Mamsadhatuagni, Srotorodha*, and *Beeja Dushti*. Therefore, the following treatment approach is employed to correct the impaired *Mamsadhatuagni,* remove *Srotorodha* (channel blockages) and balance *Vata Dosha*.

Deepan pachana

In Ayurveda, the concept of *Dhatupaka Avastha*, which emphasizes the importance of *Agni* (digestive fire) in the formation of subsequent tissues (*Dhatus*[20]. To correct the impairment of *Mamsa Dhatu Agni* (the metabolic process related to muscle tissue), it is essential to administer *Deepana* (appetizers) and *Pachana* (digestives). These enhance the *Dhawagni* and strengthen the *Dhatu* formation process.

***Shodhana* (Purification)**

The elimination of metabolic toxins from the body is crucial in managing BMD. This is achieved through *Panchakarma*, a set of five therapeutic procedures that cleanse the body, eliminate waste metabolic products, remove blockages in the channels (*Srotorodha*), and purify the *Srotas* (channels).

***Purvakarma* (Preparation Phase)**

The preparatory process, or *Purvakarma*, involves treatments that prepare the body for the main purification procedures. Acharya mentions the concept of "*Bruhmanyastu Mrudu Langyet*," which signifies the use of *Rukshana chikitsa* (drying therapy) to enhance *Brimhana* (nourishing) treatments [21].

For *Rukshana chikitsa, Udvartana* (a type of powder massage) using *Kolakulathadi Choorna* (herbal powder) is recommended. This therapy helps to remove blockages in the channels *(Srotorodha)* and stabilizes the limbs (*Sthirikaran* of *Angas*) [22].

***Pradhana Karma* (Main Treatment Phase)**

The primary treatment for managing BMD focuses on *Basti karma* (medicated enema), which is particularly effective in balancing *Vata Dosha*. Since BMD issues are primarily due to the aggravation of *Vata Dosha, Basti* is the main purification therapy for maintaining balanced *Vata*.

Niruha Basti

This is a highly effective therapy in the *Panchakarma* regimen, known for its ability to repair damaged muscles and nerves.

Rajayapana Basti

This type of *Basti* has dual effects purification *(Shodhana)* and nourishment *(Brimhana).* It pacifies the aggravated *Vata Dosha,* increases strength, and promotes longevity. *Rajayapana Basti* is characterized by its instant nourishing *(Sadhyo Balanjanana)* and rejuvenating *(Rasayana)* properties, which enhance bodily strength and vitality quickly. It can be administered over an extended period, effectively eliminating metabolic toxins from the colon and improving absorption from the colonic mucosa. Consequently, the absorption of rejuvenating therapies *(Rasayana)* is enhanced after *Basti* therapy [23].

***Rajayapana Basti* composition and its Actions**

The composition of *Basti* plays a crucial role in its therapeutic effectiveness:

- ***Ksheera* (Milk):** Due to its sweet taste *(Madhura Rasa),* heavy in nature *(Guna),* and life-promoting qualities *(Jeevaniya),* milk provides rejuvenating *(Rasayana),* aphrodisiac *(Vrishya),* strengthening *(Balya),* intellect-enhancing *(Medhya),* and nourishing *(Brimhana)* effects.
- ***Madhu* (Honey):** Honey has properties that make it an excellent vehicle *(Yogavahi),* a rejuvenator *(Rasayana),* and a *Tridosha* balances *(Tridoshahara).* It nourishes the muscles and removes adhered doshas from the *Srotas*.
- ***Kalka* (Herbal Paste):** The paste of herbs enhances the nourishing *(Brimhana)* and strengthening *(Balya)* properties of the *Basti*. It also increases the viscosity of the Basti solution, ensuring it remains in the colon *(Pakwashaya)* for an appropriate duration.
- ***Saindhava Lavan* (Rock Salt):** Due to its fine nature *(Sukshma Guna),* rock salt helps the *Basti* reach the micro-channels of the body.
- ***Sneha* (Unctuous Substances like Ghee):** Due to its *Vatapittahara* (balancing *Vata* and *Pitta*), sweet taste *(Madhura Rasa),* and cooling nature *(Shita Veerya),* ghee enhances strength *(Bala),* complexion *(Varna),* taste *(Rasa),* reproductive tissue *(Shukra),* and vitality *(Ojas)* [24].

These ingredients collectively provide both cleansing *(Shodhana)* and nourishing *(Brimhana)* effects. The *Shodhana* effect cleanses the channels by removing blockages *(Srotorodha)* and eliminating metabolic toxins, while the *Brumhana* effect strengthens the muscles and improves muscle tone, which is

particularly beneficial for patients with, muscular dystrophy like Beckers muscular dystrophy.

Virechana

Virechan is a detoxification process that removes toxins from the body, leading to better absorption of *Rasayana* drugs and other *Brihmana Dravyas*. It also corrects *Agni*, the digestive fire, which is essential for proper digestion and assimilation of nutrients.

Benefits of *Virechan*

- Detoxification and removal of toxins
- Improved absorption of *Rasayana* drugs and *Brumhana dravyas.*
- Correction of *Agni* and improvement in digestion.

Matrabasti Karma

Matrabasti is a variety of *Basti Karma* that rejuvenates the body and helps to improve *Dhatukshaya*, a condition caused by *Vata Dosha*. It is often used in conjunction with *Virechana* to enhance its benefits.

Matrabasti with the *Brumhana dravyas* like *Balaashwgandha Taila, Ashwangandha Ghrita*, *Ksheerbala Taila* etc.

Benefits of *Matrabasti*

- Rejuvenation of the body
- Improvement in *Dhatukshaya* caused *Vata dosha*.

Shamana oushdhis

The *Dravya* having the *Brumhana*, *Dhatuvardhaka*, *Balya* and *Rasayana* action such *Dravyas* are used for the treatment.

Churnas

- *Ashwagandha churna*
- *Kapikacchu churna*
- *Shatavari churna*

Kashayas

- *Bhadradarvadi kashayam*
- *Devdarvadi kashayam*
- *Indukantha kashayam*
- *Vidaryadi Kashaya*
- *Kalyanaka ksheer Kashaya*

Asava & Arishta

- *Ashwagandharishta*
- *Balarishta*
- *Dashamoolarishta*
- *Draksharishta*
- *Vidaryasava*
- *Pippalyasava*
- *Arvindasava*

Rasoushadhis

- *Ekangveera rasa*
- *Vasanta kusumakara rasa*
- *Swarna makshika bhasma*

Shamana snehapana

- *Kushmanda ghruta*
- *Ashwagandha ghruta*
- *Indukanta ghruta*

Rasayana

Rasayana Chikitsa is an ancient Ayurvedic therapy that rejuvenates the body's functional dynamics and delays degeneration. Ayurvedic physicians use herbal, mineral, and metallic resources to increase enzymatic essence in each *Dhatu*, starting from *Rasadhatu*. However, *Rasayana* therapy requires purificatory procedures like *Deepana, Pachana*, and *Panchakarma* to balance *Dosha*, eliminate metabolic toxins, and strengthen the body's immune system. Only after purification *Rasayana* therapy can be effective.

- *Aja mamsa rasayana*
- *Ashwagandha rasayana*
- *Narasimha rasayana*
- *Kushmanda rasayana*
- *Chyavanprash rasayana*
- *Agastya rasayana*

Ekamulika Paryoga

Certain herbs like *Curcuma longa, Withania somnifera*, *Terminalia Arjuna*, and *Tinospora cordifolia* have shown promise in managing muscular dystrophy and other degenerative diseases. These herbs have anti-inflammatory, immunomodulatory, and antioxidant properties, which help regenerate neurons, improve cardiac function, and boost the immune system [25,26,27].

Yogic practice

Yogic practices like *Pavanmuktasana* and *Bhastrica Pranayama* can help to manage muscular dystrophy symptoms[28], improving respiratory function, flexibility, and overall well-being. Deep breathing and laughing are also recommended to slow disease progression, reduce stress, and boost mood. Regular practice can enhance quality of life for those with muscular dystrophy.

By combining these ancient Ayurvedic techniques with modern scientific research, we can unlock the full potential of *Shodhana, Shamana* and *Rasayana Chikitsa* in preventing and managing degenerative diseases. This holistic approach can lead to improved overall health, increased vitality, and enhanced quality of life.

DISCUSSION

- The article discusses the Ayurvedic management of Becker Muscular Dystrophy (BMD), a genetic disorder characterized by progressive muscle weakness and degeneration. In Ayurveda, BMD is understood as a vitiation of *Vata dosha* and a defect in the genetic material or "seeds" *(Beeja Dushti).* The management approach aims to correct impaired *Mamsadhatuagni* (muscle tissue metabolism), remove *Srotorodha* (channel blockages), and balance *Vata Dosha.*
- The treatment involves *Deepan Pachana* (appetizers and digestives) to enhance digestion and nutrient absorption, *Shodhana* (purification) through *Panchakarma* to eliminate metabolic toxins and waste products, and *Basti* therapy (medicated enema) to repair damaged muscles and nerves and balance *Vata Dosha. Rasayana* therapy is also employed to rejuvenate the body and delay degeneration.
- Yogic practices like *Pavanmuktasana* and *Bhastrica Pranayama* are recommended to improve respiratory function, flexibility, and overall well-being. The article highlights the potential of Ayurvedic management in reducing muscle damage and improving functional ability in muscular dystrophy patients, potentially leading to longer survival with less disability.
- However, it is essential to note that Ayurvedic management does not address the underlying genetic cause of BMD. A holistic approach combining Ayurvedic techniques with modern scientific research can lead to improved overall health and enhanced quality of life

CONCLUSION

- Becker Muscular Dystrophy (BMD) is a milder form of X - linked muscular dystrophy, characterized progressive muscle weakness. Conventional medical treatments focus on managing symptoms and improving quality of life through drug therapy, physical therapy, and surgical interventions. While these treatments offer symptomatic relief, not permanent cure.
- Ayurvedic management provides a holistic approach to BMD, emphasizing the balance of *Vata dosha* and the purification of bodily systems through *Panchakarma* therapies. By incorporating *Deepan Pachana, Shodhana* (purification), and *Rasayana* therapies, Ayurveda aims to rejuvenate muscle tissues, improve metabolism, and enhance overall vitality. Although Ayurvedic treatments do not cure the genetic basis of BMD, they show promise in reducing muscle damage, slowing disease progression, and improving functional abilities.
- Future research should focus on integrating Ayurvedic principles with modern genetic research to explore potential therapies that target the genetic and metabolic aspects of BMD. Investigating the efficacy of Ayurvedic herbs, formulations, and treatments in controlled clinical trials could provide valuable insights into their role in managing muscular dystrophies. Additionally, developing personalized Ayurvedic protocols based on individual dosha imbalances and genetic predispositions may offer a more tailored approach to managing BMD.

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